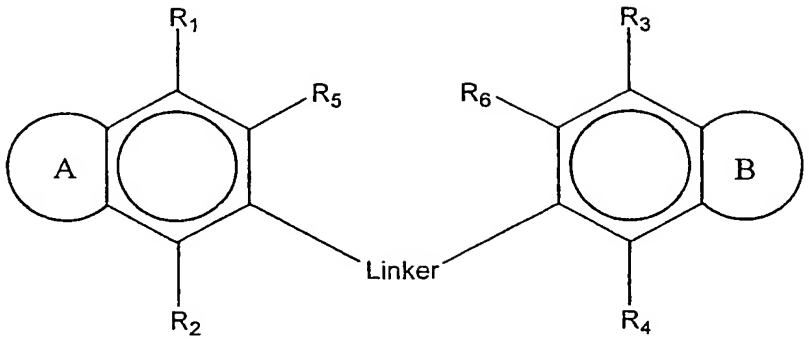
Claims

1. A compound of the formula I



I

wherein R_1, R_2, R_3 and R_4 are independently selected from hydrogen, hydroxy, optionally substituted alkyl, optionally substituted alkoxy, optionally substituted alkenyl, optionally substituted alkynyl, optionally substituted haloalkyl, optionally substituted cycloalkyl, optionally substituted aryl, optionally substituted arylalkyl, optionally substituted cycloalkylalkyl, cyano, halo, alkoxycarbonyl, alkyl carbonyloxy, alkylamido, nitro and alkylamino;

Linker is a divalent spacer group that provides a spacing between the two aromatic rings to which it is joined of from 6 to 11 atoms when measured across the shortest route between the two aromatic rings;

A and B are fused rings independently selected from optionally substituted 5- to 7-membered aromatic, heteroaromatic and non-aromatic heterocyclic rings;

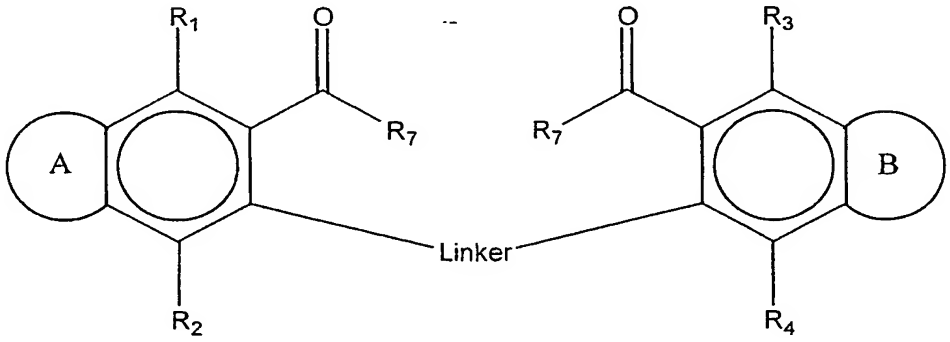
R_5 and R_6 are independently selected from $-C(O)R_7$, $-C(NR_7)R_7$ and $-C(S)R_7$, wherein each R_7 is independently selected from hydrogen, an alkyl group, an alkoxy group and an hydroxy group;

with the proviso that at least one of R_1, R_2, R_3, or R_4 is not a methoxy group when R_5 and R_6 are $-C(O)CH_3$, rings A and B are unsubstituted furyl and Linker is $-O-CH_2-C_6H_4-CH_2-O-$;

or a salt or pharmaceutically acceptable derivative thereof.

2. A compound according to claim 1 wherein rings A and B are independently selected from optionally substituted isoxazolyl, oxazolyl, imidazolyl, thiazolyl, isothiazolyl, pyridinyl, furyl, pyrimidinyl, pyrazolyl, pyrrolyl, pyridazinyl, furyl and thiophenyl.

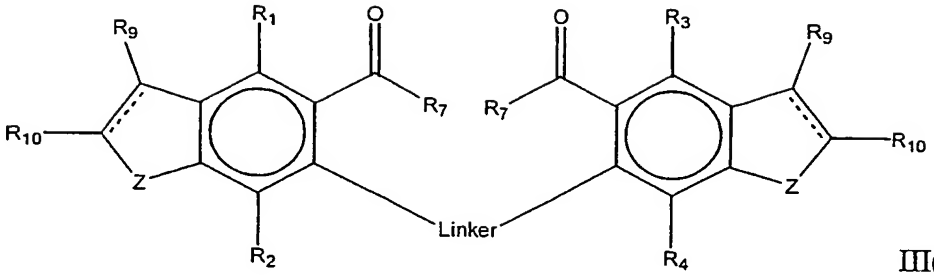
3. A compound according to claim 1 or 2 having the formula II



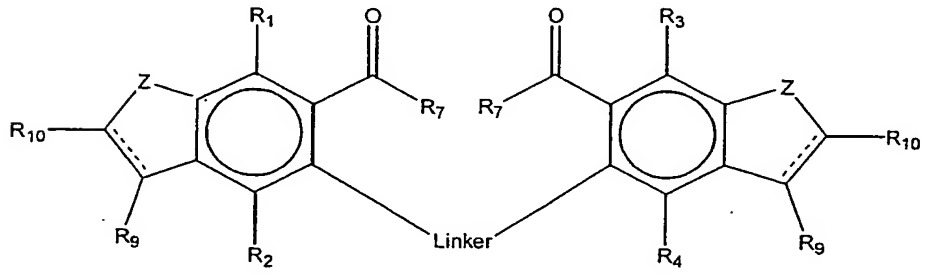
II

wherein R_1, R_2, R_3, R_4, Linker, A and B are as earlier defined and each R_7 is independently selected from an alkyl or alkoxy group, with the proviso that at least one of R_1, R_2, R_3, or R_4 is not a methoxy group when R_5 and R_6 are $-C(O)CH_3$, rings A and B are unsubstituted furyl and Linker is $-O-CH_2-C_6H_4-CH_2-O-$, or a salt or pharmaceutically acceptable derivative thereof.

4. The compound according to claim 3 having the formula IIIa or IIIb



III(a)



III(b)

wherein R_1, R_2, R_3, R_4, R_7 and Linker are as defined in claim 3,

each Z is independently selected from O, S, NH and N(loweralkyl);

each R_9 and R_{10} are independently selected from hydrogen, hydroxy, optionally substituted alkyl, optionally substituted alkoxy, optionally substituted alkenyl, optionally substituted alkynyl, optionally substituted haloalkyl, optionally substituted cycloalkyl, optionally substituted aryl, optionally substituted arylalkyl, optionally substituted cycloalkylalkyl, cyano, halo, alkoxycarbonyl, alkyl carbonyloxy, alkylamido, nitro and alkylamino;

the dashed lines represent optionally present bonds;

with the proviso that at least one of R_1, R_2, R_3, or R_4 is not a methoxy group when R_7 are both CH_3, each R_9 and R_{10} are hydrogen, each Z is O, both dashed lines represent bonds and Linker is $-O-CH_2-C_6H_4-CH_2-O-$;

or a salt or pharmaceutically acceptable derivative thereof.

5. A compound according to any one of claims 1 to 4 wherein Linker is a divalent group is an optionally substituted alkylene group having from 6 to 11 carbon atoms when measured across the shortest route between the two aromatic rings in which:

(a) optionally one or more of the methylene groups in the bridging portion can replaced with O, S or NR^a where R^a is selected from hydrogen or lower alkyl; and,

(b) optionally one or more of the methylene ($-CH_2-$) moieties in the bridging portion are replaced with atoms forming part of a ring structure; and

(c) optionally the bridging portion includes one or more unsaturated sites wherein two adjacent methylene groups are replaced with an unsaturated site.

6. A compound according to claim 5 wherein the Linker is a divalent moiety of the form $-X-(CH_2)_n-X-$, where each X is the same or different and is selected from O, S and NR^a (where R^a is independently hydrogen or lower alkyl), where n is a integer of from 4 to 9, and the methylene moieties are optionally substituted and optionally include one or more unsaturated sites.

7. A compound according to claim 5 wherein the Linker is a optionally substituted divalent moiety of the form $-X-(CH_2)_p-Y-(CH_2)_q-X-$, in which:

X is independently selected from O, S and NR^a (where R^a is independently hydrogen or lower alkyl), p and q are integer numbers equal to or greater than 1;

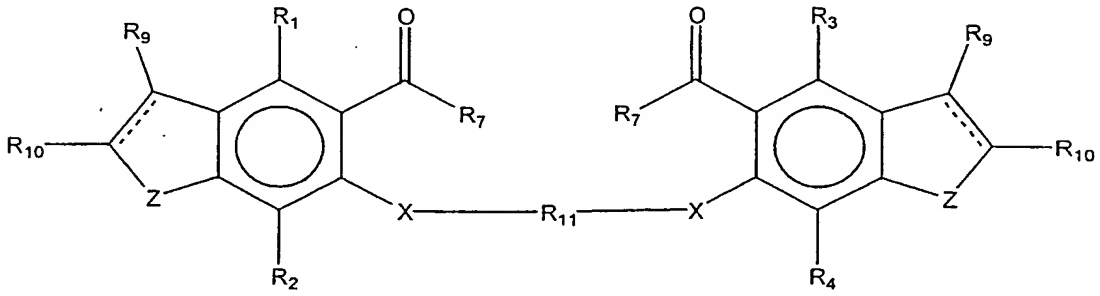
the moities $-(CH_2)_p-$ and $-(CH_2)_q-$ optionally incorporate one or more unsaturated sites by replacing two adjacent methylene groups with an unsaturated site;

Y is selected from an optionally substituted aromatic ring; -S-S-; -O-; -C(O)-; -C(O)O-; and $-NR^bC(O)-$ wherein R^b is hydrogen or lower alkyl.

8. A compound according to claim 7, wherein Y is an optionally substituted phenyl moiety.

9. A compound according to any one of claim 6 to 8 wherein each X is –O-.

10. A compound according to claim 3 having the formula IV



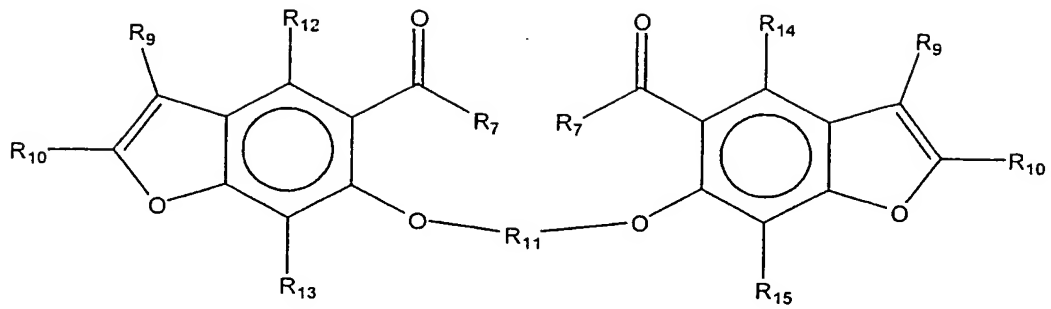
IV

wherein R_1, R_2, R_3, R_4, R_7, R_9, R_{10}, Z and the dashed lines are as defined for claim 3, and each X is independently a heteroatom selected from S, O NH and N(lower alkyl) and R_{11} is a divalent group having from 4 to 9 atoms along the shortest distance between the heteroatoms X to which it is attached;

with the proviso that at least one of R_1, R_2, R_3, or R_4 is not a methoxy group when each R_7 is CH_3, each Z is O, each R_9 and R_{10} is hydrogen, each X is O and R_{11} is $-CH_2-C_6H_4-CH_2-$;

or a salt or pharmaceutically acceptable derivative thereof.

11. A compound of claim 10 having the Formula V



V

wherein each R_7, R_9, R_{10} and R_{11} are as defined in claim 10, and

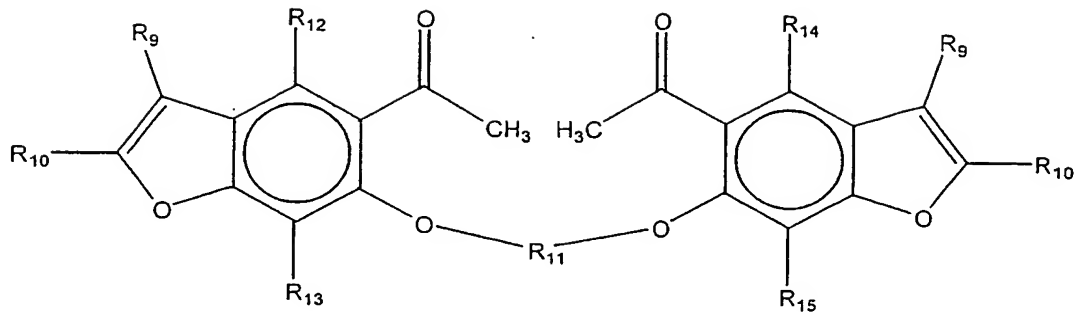
R_{12} and R_{14} are independently selected from H, OH, cyano, halo, nitro and an optional substituted group selected from alkyl, alkenyl, alkoxy, optionally substituted alkynyl, haloalkyl, cycloalkyl, aryl, arylalkyl, cycloalkyl alkyl, alkoxycarbonyl, alkylcarbonyloxy, alkylamido and alkylamino;

R_{13} and R_{15} are independently selected from H, OH, and an optionally substituted group selected from alkyl, alkoxy, aryloxy, heteroaryloxy, alkylcarbonyloxy and arylcarbonyloxy;

with the proviso that at least one of R_{12}, R_{13}, R_{14} and R_{15} is not methoxy when R_7 is methyl, R_9 and R_{10} are H, and R_{11} is $-CH_2C_6H_4CH_2-$;

or a salt or pharmaceutically acceptable derivative thereof.

12. A compound according to claim 11 having the formula VI



VI

wherein each R_9, R_{10}, R_{11}, R_{12}, R_{13}, R_{14} and R_{15} are as defined in claim 11, or a salt or pharmaceutically acceptable derivative thereof.

13. A compound according to claim 12 wherein each R_9 and R_{10} is hydrogen or optionally substituted alkyl and each R_{12} and R_{13} are optionally substituted alkyloxy.

14. A compound according to any one of claims 10 to 13 wherein R_{11} is:-

(a) an optionally substituted divalent moiety of the form $-(CH_2)_n-$, where n is an integer of from 4 to 9, and the methylene groups optionally include one or more unsaturated sites; or

(b) an optionally substituted divalent moiety of the form $-(CH_2)_p-Y-(CH_2)_q-$, where p and q are integer numbers equal to or greater than 1, $-(CH_2)_p-$ and $-(CH_2)_q-$ optionally include one or more unsaturated sites, Y is selected from an optionally substituted aromatic ring, -S-S-, $-NR^bCO-$ and -O-, where R^b is hydrogen or lower alkyl.

15. A compound according to claim 14 where R_{11} is an optionally substituted moiety of the formula $-(CH_2)_n-$, where n is an integer from 4 to 7, or an optionally substituted moiety of the formula $-CH_2-C_6H_4-CH_2-$.

16. A compound according to claim 15 wherein the phenyl group incorporated in R_{11} is optionally substituted with a polar group.

17. A compound selected from: -

1,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxy)pentane;
1,6-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxy)hexane;
1,4-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxy)butane;
1,4-bis(5-acetyl-4-methoxybenzofuran-6-yloxymethyl)benzene;
di-(5-acetyl-4-methoxybenzofuran-6-yloxyethyl)ether;
1,4-bis(5-acetyl-4-methoxybenzofuran-6-yloxymethyl)benzoic acid;
1,4-bis(5-acetyl-4-methoxybenzofuran-6-yloxymethyl)benzoic acid methyl ester;
1,4-bis(5-acetyl-4-methoxybenzofuran-6-yloxymethyl)benzoic acid, tetraethyleneglycol monomethyl ether ester;
5-acetyl-4,7-dimethoxybenzofuran-6-yloxyethanethiol, disulfide dimer;
1,6-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxy)-N-methyl-3-aza-4-oxohexane;
2,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)furan;
2,4-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)furan;
2,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)thiophene;
2,4-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)thiophene;
2,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)thiazole;
2,4-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)thiazole;
2,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)thiadiazole;
1,4-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)cyclopentane;
2,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)tetrahydrofuran;
2,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)tetrahydrothiophene;
1,4-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)-2-hydroxybenzene;
2,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)pyridine;
2,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)pyrimidine;
2,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)pyrazine;
3,6-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)pyridazine;

2,6-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)pyridine;
2,6-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)pyrimidine;
2,6-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)pyridazine;
2,4-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)pyridine;
4,6-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)pyrimidine;
3,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)pyridine;
3,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-yloxymethyl)pyridazine;
1,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-ylthio)pentane;
1,6-bis(5-acetyl-4,7-dimethoxybenzofuran-6-ylthio)hexane;
1,4-bis(5-acetyl-4,7-dimethoxybenzofuran-6-ylthio)butane;
1,4-bis(5-acetyl-4-methoxybenzofuran-6-ylthiomethyl)benzene;
1,5-bis(5-acetyl-4,7-dimethoxybenzofuran-6-ylamino)pentane;
1,6-bis(5-acetyl-4,7-dimethoxybenzofuran-6-ylamino)hexane;
1,4-bis(5-acetyl-4,7-dimethoxybenzofuran-6-ylamino)butane; and
1,4-bis(5-acetyl-4-methoxybenzofuran-6-yloxyamino)benzene.

18. A method of preventing or treating of autoimmune or chronic inflammatory diseases, the prevention of rejection of foreign organ transplants and/or related afflictions, diseases and illnesses by the administration of an effective amount of a compound of any one of claims 1 to 17 or a pharmaceutically acceptable derivative thereof.

19. A method of modulating potassium ion channel activity of T-cells by the administration of an effective amount of compound of any one of claims 1 to 17 or a pharmaceutically acceptable derivative thereof.

20. A pharmaceutical composition comprising an effective amount of compound of any one of claims 1 to 17, or a pharmaceutically acceptable derivative thereof, and optionally a carrier or diluent.

21. Use of a compound according to any one of claims 1 to 17, or a pharmaceutically acceptable derivative thereof, in the manufacture of a medicament for the treatment or prevention of autoimmune or chronic inflammatory disease, or the prevention of rejection of foreign organ transplants and/or related afflictions.